IN THE CLAIMS:

Claims 1-9 (Canceled).

10. (Currently Amended) A high-strength bolted connection structure provided substantially without needs of a fire protection, and having a fire resistance of a steel structure which includes at least one of columns and beams made of fire resistant steel, the structure comprising:

ultra-high-strength bolts, each of the bolts having a bolt tensile strength of at least 1200 N/mm^2 at a room temperature and the fire resistance with a bolt shear proof stress at 650°C satisfying the following:

$$b\tau t \geq \mu \times N_o/(\nu \times bAs)$$

wherein:

$b\tau t$ is the bolt shear proof stress, such that $b\tau t = TSt/\sqrt{3}$,

TSt is the tensile strength of the bolts at a predetermined high temperature,

μ is α coefficient of slip at the room temperature,

N_o is a design bolt tension,

ν is safety factor for a long-term load, and

bAs is a cross-sectional area of a bolt shank.

11. (Previously Presented) The bolted connection structure according to claim 10,

wherein at least one particular beam of the beams has a long-term allowable shear force at the room temperature which satisfies the following:

$$Qs \leq \{ns \times b\tau + (nf - ns) \times b\tau t\} \times bAs, \text{ and}$$

wherein:

Qs is a long-term allowable shear force of the particular beam at the room temperature, such that $Qs = fs \times Ab$,

fs is an particular long-term allowable shear proof stress of the beam,

Ab is a cross-sectional area of the particular beam,

ns is a number of tension bolts in a floor slab on an upper flange side of the particular beam,

$b\tau$ is a shear proof stress of bolt at the room temperature, such that $b\tau = TS / \sqrt{3}$,

TS is a tensile strength of the bolts at the room temperature, and

nf is a number of tension bolts on the upper flange side of the particular beam.

12. (Previously Presented) The bolted connection structure according to claim 10, further comprising:

sets of a high-strength bolt, a nut, a washer and joint metals, wherein the nut is a general structural hexagon nut, and the washer is a structural high-strength plain washer, and wherein no fire resistance is provided for the nut and the washer.

13. (Previously Presented) The bolted connection structure according to claim 10, further comprising:

sets of a high-strength bolt, a nut, a washer and joint metals, wherein at least a portion of the joint metals are composed of a steel material having a predetermined high-temperature strength.

14. (Previously Presented) The bolted connection structure according to claim 10, wherein at least a portion of at least one of the columns and the beams used is composed of a steel material having a predetermined high-temperature strength.

15. (Previously Presented) The bolted connection structure according to claim 10,

wherein at least one particular bolt of the high-strength bolts is an ultra-high-strength bolt which contains approximately, in % by weight, C: 0.30 ~ 0.45%, Si: less than 0.10%, Mn: more than 0.40% ~ less than 1.00%, P: less than 0.010%, S: 0.010% or less, Cr: 0.5% or more ~ less than 1.5%, Mo: more than 0.35% ~ less than 1.5%, V: more than 0.3% ~ 1.0% or less, with the balance being Fe and unavoidable impurities, and which has the fire resistance and a particular resistance to a delayed fracture such that following relations are satisfied:

$TS \leq (1.1 \times T + 850)$, and

$TS \leq (550 \times Ceq + 1000)$,

wherein:

TS is a tensile strength of the particular bolt at the room temperature,

T is a tempering temperature, and

Ceq is carbon equivalent, such that

$$Ceq = C + (Mn/6) + (Si/24) + (Ni/40) + (Cr/5) + (Mo/4) + (V/14).$$

16. (Previously Presented) The bolted connection structure according to claim 12, wherein the high-strength bolt is an ultra-high-strength bolt which contains approximately, in % by weight, C: 0.30 ~ 0.45%, Si: less than 0.10%, Mn: more than 0.40% ~ less than 1.00%, P: less than 0.010%, S: 0.010% or less, Cr: 0.5% or more ~ less than 1.5%, Mo: more than 0.35% ~ less than 1.5%, V: more than 0.3% ~ 1.0% or less, with the balance being Fe and unavoidable impurities, and which has the fire resistance and a particular resistance to a delayed fracture such that following relations are satisfied:

$TS \leq (1.1 \times T + 850)$, and

$TS \leq (550 \times Ceq + 1000)$,

wherein:

TS is a tensile strength of the high-strength bolt at the room temperature,

T is a tempering temperature, and

Ceq is carbon equivalent, such that

$$Ceq = C + (Mn/6) + (Si/24) + (Ni/40) + (Cr/5) + (Mo/4) + (V/14).$$

17. (Previously Presented) The bolted connection structure according to claim 13, wherein the high-strength bolt is an ultra-high-strength bolt which contains approximately, in % by weight, C: 0.30 ~ 0.45%, Si: less than 0.10%, Mn: more than 0.40% ~ less than 1.00%, P: less than 0.010%, S: 0.010% or less, Cr: 0.5% or more ~ less than 1.5%, Mo: more than 0.35% ~ less than 1.5%, V: more than 0.3% ~ 1.0% or less, with the balance being Fe and unavoidable impurities, and which has excellent fire resistance and resistance to delayed fracture such that following relations are satisfied:

$TS \leq (1.1 \times T + 850)$, and

$TS \leq (550 \times Ceq + 1000)$,

wherein:

TS is a tensile strength of the high-strength bolt at room temperature,

T is a tempering temperature, and

Ceq is carbon equivalent, such that

$$Ceq = C + (Mn/6) + (Si/24) + (Ni/40) + (Cr/5) + (Mo/4) + (V/14).$$

18. (Previously Presented) The bolted connection structure according to claim 14,

wherein at least one of the bolts is an ultra-high-strength bolt which contains approximately, in % by weight, C: 0.30 ~ 0.45%, Si: less than 0.10%, Mn: more than 0.40% ~ less than 1.00%, P: less than 0.010%, S: 0.010% or less, Cr: 0.5% or more ~ less than 1.5%, Mo: more than 0.35% ~

less than 1.5%, V: more than 0.3% ~ 1.0% or less, with the balance being Fe and unavoidable impurities, and which has excellent fire resistance and resistance to delayed fracture such that following relations are satisfied:

$$TS \leq (1.1 \times T + 850), \text{ and}$$

$$TS \leq (550 \times Ceq + 1000),$$

wherein:

TS is a tensile strength of the high-strength bolt at the room temperature,

T is a tempering temperature, and

Ceq is carbon equivalent, such that

$$Ceq = C + (Mn/6) + (Si/24) + (Ni/40) + (Cr/5) + (Mo/4) + (V/14).$$